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CTS Research E-News brings you the latest research project milestones, published reports, and seminar coverage.

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Policy & Planning***Asking the Right Questions About Transportation and Land Use: First research summary released***

"What if solid research showed that even as congestion is getting worse, most people in the Twin Cities are finding it easier to get where they need to go?" That provocative question is among the issues explored in *Asking the Right Questions About Transportation and Land Use*, a new research summary from the University of Minnesota's Access to Destinations Study.

The research summary serves as both an introduction to the Access to Destinations Study and a summary of the study's initial findings. It is the first in a planned series of research summaries that will present findings and policy implications to a broad audience of transportation stakeholders, policymakers, and others interested in the future of the transportation system.

At the heart of the summary are the findings of the first Access to Destinations research report, published in November 2006. Report authors **David Levinson** and **Ahmed El-Geneidy** explored techniques for measuring accessibility—particularly the access of workers to jobs and of employers to labor—using automobiles as the primary mode of transportation.

In addition to employment access, the researchers also looked at how accessibility can affect home prices and patterns of land use. Linking transportation to land use is one of the main goals of the Access to Destinations Study.

Although Levinson and El-Geneidy note that there is no single "right" way to measure accessibility, the question of what type of measurement yields the most useful picture of accessibility across a diverse metropolitan region is important. After considering methods used in previous studies, the Minnesota researchers chose to develop their own novel approach to measuring accessibility, dubbed "Place Rank."

Traffic congestion, the summary notes, is one of the most talked-about issues in many cities today and is often linked to economic development as commuters jam the freeways to reach their jobs. The findings of the first Access to Destinations research report paint a complex picture of congestion—one in which people's choices about where to live are influenced not only by proximity to employment but also by access to retail areas, public amenities, and special destinations.

One of the key research products described in the summary and currently under development is an "accessibility matrix" covering the entire Twin Cities region. For each of many origin areas, the matrix will measure accessibility to important destination activities—such as employment, shopping, and entertainment—using a variety of transportation modes.



Gary Davis and Kate Sanderson

Balancing roads and transit to meet future transportation needs

Traffic congestion—few issues today are so important to urban and suburban residents, or the subject of such heated debate. In a recent survey, residents of the Minneapolis-St. Paul metropolitan area rated congestion as a top issue facing the region for the fifth year in a row. As concern about congestion continues to grow, researchers at the University of Minnesota are searching for new ways of meeting the needs of a growing population with a balance of new roads and other travel modes, especially public transit.

With sponsorship from the [Minnesota Department of Transportation](#), civil engineering professor **Gary Davis** and Ph.D. student **Kate Sanderson** led a recent research project with research assistant **HunWen Tao** that explored ways of meeting the region's future transportation needs. Their work focuses on balancing the pressure to build new roads and the potential benefits of alternate modes. Their final research report, [Capacity Expansion in the Twin Cities: The Roads-Transit Balance](#), is now available.

Davis and Sanderson's new research builds on the findings presented in the research team's 2001 report, [Building Our Way Out of Congestion? Highway Capacity for the Twin Cities](#). In that work, Davis and Sanderson examined methodologies for planning for future growth and asked how much new road construction would be necessary to maintain current levels of service on Twin Cities highways if current trends for population growth and travel demand continue through the year 2020.

In that study, the researchers concluded that more than 1,100 lane-miles of new highway would be required to fully accommodate future growth—a 70 percent expansion of the current freeway system. Given powerful constraints that include cost, construction delays, and the availability of right-of-way, their research suggested that a policy of "building our way out of congestion" might not be able to meet the region's future needs.

Since those initial findings were published, Davis and Sanderson have gone on to study other approaches to meeting the region's future transportation needs. In their new report, they focus on the potential power of transit to reduce the amount of new construction required to get Twin Cities residents where they need to go. While fewer vehicles on the road may mean fewer lanes required, the researchers note that the relationship between transit capacity and road capacity is not a simple linear trade-off.

Davis and Sanderson's findings may have implications beyond the build-or-bus debate. A better understanding of how transit affects private-vehicle travel, they say, can shed light on the potential effectiveness of other demand-reduction strategies, such as telecommuting or changes in land-use policy designed to encourage reductions in single-occupant vehicle use.

[Capacity Expansion in the Twin Cities: The Roads-Transit Balance](#) is available on the CTS Web site.

Safety & Security

Report offers guidance for applying rumble strips at rural intersections

Some counties in Minnesota use rumble strips at many of their rural stop-controlled intersections while other counties hardly use them at all. How effective are rumble strips, and what types of sites—if any—are good candidates for them? The third in a series of studies by **Kathleen Harder** and **John Bloomfield** of the Center for Human Factors Systems Research and Design provides guidelines for more standardized usage.

In this project funded by the [Minnesota Local Road Research Board](#), the researchers studied the effect of rumble strips on the stopping behavior of drivers at 10 Minnesota intersections. They found that drivers slowed down earlier on approaches with rumble strips than on those without: the difference was, on average, 2.0 mph to 5.0 mph (depending on vehicle category and type of approach). In addition, speeding "outliers" (such as one driver nearing 80 mph) were more likely to slow down earlier on approaches with rumble strips.

A key factor, the researchers found, is whether an intersection is obscured by vegetation or man-made structures. Rumble strips had a bigger impact at sites where the driver on the minor road cannot see cross-traffic on one or both sides of the intersection.

Harder shared her findings at a seminar held February 8 as part of the [CTS Research Seminar series](#). Based on these findings, Harder said, "we believe the addition of rumble strips to rural intersections with poor sightlines is likely a good idea." Where traffic is visible on both sides of the intersection, they do not recommend installing rumble strips, unless the stop-controlled intersection in question is preceded by miles of uninterrupted roadway.

For the project, the researchers visited 151 intersections in 16 Minnesota counties. The intersections, chosen with the help of county engineers, yielded 274 approaches, from which pairs of intersections with similar sightlines were selected; one of each pair had rumble strips while the other did not. Research assistant **Ben Chihak** then used a radar gun to collect speed data from more than 400 vehicles at 10 selected intersections.

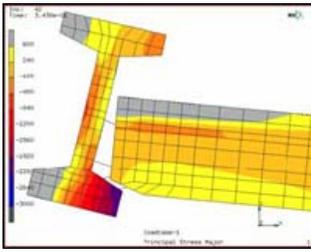
This third study built upon findings of two earlier studies. In the first ([The Effects of In-Lane Rumble Strips on the Stopping Behavior of Attentive Drivers](#), Mn/DOT 2002-11), the researchers used a wrap-around driving simulator to establish a baseline for the effects of rumble strips on the behavior of attentive drivers. They found that with rumble strips present, drivers started to brake earlier in the slowdown process.

In the second study ([The Effects of In-Lane Rumble Strips on the Stopping Behavior of Sleep-Deprived Drivers](#), Mn/DOT 2005-16), also using a laboratory simulator, researchers analyzed 20 sleep-impaired commercial vehicle operators. The rumble strips consistently produced a more controlled stopping behavior.

In all three studies, drivers reduced speed earlier and to a greater extent at intersections with rumble strips. Harder cautioned, however, that while rumble strips are likely to reduce crashes, they cannot eliminate them. The devices will not stop a vehicle, nor will they prevent a driver from turning into or crossing a major road because of poor gap perception. She also noted that none of the drivers in the studies actually ran a stop sign with or without rumble strips.

[Stopping Behavior at Real-World Stop-Controlled Intersections With and Without In-Lane Rumble Strips](#) (Mn/DOT 2006-42) is available on the LRRB Web site.

Transportation Infrastructure



Computer modeling was used to simulate a bridge impact

Busting bridges in the laboratory

What happens when an 18-wheel flatbed truck hauling an overheight load crashes into the underside of a concrete pedestrian bridge? It happens more often than you might think, and researchers in the University of Minnesota's [civil engineering department](#) recently set out to study how well a bridge design commonly used in Minnesota can stand up to such an impact.

With sponsorship from the [Minnesota Department of Transportation](#), professors **Arturo Schultz** and **Catherine French**, working with graduate student **Eray Baran**, focused their research on a common through-girder design in which two prestressed girders support a cast-in-place reinforced concrete deck. Because they support much lighter loads, pedestrian bridges are more lightly constructed than vehicle bridges, making them more vulnerable to collapse under the stresses of impact.

Unfortunately for those who crave action in their engineering research, slamming a fully loaded tractor-trailer into a test bridge was not an option in this study. Instead, the researchers employed a combination of laboratory testing and computer modeling to generate a detailed picture of the structure's performance.

In the laboratory, specimens that duplicate the construction techniques used in actual pedestrian bridges were tested in order to calibrate a finite-element computational model of a complete bridge. This model was subjected to a variety of static and impact loading conditions to reveal its strength and stability. Finally, the model was tested to see how well it would perform following simulated damage of the type caused by a large vehicle impact.

The collision research also provided an opportunity to answer questions about the ductility of the prestressed concrete girders used in this type of bridge. These girders are heavily reinforced with prestressing strands in order to support long bridge spans, leading to an overreinforced cross section that does not have the required flexural strength. Based on their findings, the researchers proposed changes in the relevant design specifications.

The researchers' final report, *Strength and Stability of Prestressed Concrete Through-Girder Pedestrian Bridges Subjected to Vehicular Impact* (Mn/DOT 2007-08), provides several recommendations for improving the design of prestressed concrete pedestrian bridges. It is available from the CTS Web site.

Transit & Alternative Modes

Getting to know transit riders

Knowing what motivates transit riders, and what they want from the system, is a key component of good transit planning. Using data from surveys of Twin Cities transit riders, two University of Minnesota researchers set out to better understand the preferences and the commuting behavior of people across the metropolitan area. The findings present an informative perspective on a diverse population of commuters.

Kevin Krizek, an associate professor in the [Humphrey Institute of Public Affairs](#), and postdoctoral researcher **Ahmed El-Geneidy**, also at the Humphrey Institute, recently published their findings in a new report. Krizek is the director of the [Active Communities/Transportation Research Group](#), which focuses on issues related to alternative transportation modes and community development. The research was funded by the [Intelligent Transportation Systems Institute](#).

The report analyzes the results of surveys of transit riders and nonriders in the Twin Cities region. Transit riders are conventionally divided into two classes: "captive" riders who have no other option but to use transit, and "choice" riders who use transit services despite having reasonable alternatives (such as private automobiles). The portion of the population that does not use transit is also divided into "auto captives" whose transportation needs can only be met through the use of private cars, and "potential riders" who would consider using transit if their personal criteria were met.

In addition to understanding the needs and preferences of different types of current and potential riders, a particular emphasis of this research is understanding how technology could be used to attract additional riders to the Twin Cities transit system. Improving security, reducing delays, and increasing riders' access to information about transit service are among the possibilities suggested by the researchers.

Better Understanding the Potential Market of Metro Transit's Ridership and Services (CTS 06-09) is available from the CTS Web site.

National Transit News

TCRP research publications available online

The federal [Transit Cooperative Research Program \(TCRP\)](#), administered by the [Transportation Research Board](#), provides practical transit research to address technical and operational issues. TCRP emphasizes putting research results into the hands of organizations and individuals that can use them to solve problems.

Recent TCRP publications include:

- ◆ [Making Transportation in Tunnels Safe and Secure](#) (TCRP Report 86 Vol. 12)
- ◆ [Web-Based Survey Techniques](#) (TCRP Synthesis 69)
- ◆ [Methods of Rider Communication](#) (TCRP Synthesis 68)

Announcements



**Dr. Jonathan Levine,
Professor and Chair
of Urban and Regional
Planning, University of
Michigan**

2007 CTS Transportation Research Conference May 1–2

Researchers, transportation professionals, and others with an interest in the future of transportation should plan to attend the [2007 CTS Transportation Research Conference](#) May 1 and 2 in St. Paul. The conference serves as a forum for researchers and practitioners from across the Upper Midwest to share their research findings in a variety of transportation-related fields. The conference will cover all modes of transportation including highway, transit, rail, air, water, and others.

Keynote speaker **James Whitty** of the Oregon Department of Transportation will speak on "Oregon's Approach to Road User Charges: The Foundation for a New Road Revenue System" and participate in a panel discussion of alternative funding strategies and proposed Minnesota finance initiatives.

The first day of the conference will also include the 2007 CTS Spring Luncheon, featuring speaker **Jonathan Levine**, professor and chair of the Urban and Regional Planning program at the University of Michigan. His presentation, titled "Zoned Out: Regulation, Markets, and Choices in Transportation and Metropolitan Land Use," will focus on the "smart growth" concept and the origins of urban sprawl. The idea that sprawl is the result of free market policies, Levine argues, is a myth that distorts current discussions of transportation and land-use planning.

A brochure and registration form are now available, including details on all plenary and break-out sessions scheduled for the conference. Online registration is available through the University of Minnesota's College of Continuing Education. As in previous years, the event will be held at St. Paul RiverCentre, located in downtown St. Paul, Minnesota. See the [Research Conference Web page](#) to register and for more information.

Upcoming Events

Here are selected events related to transportation research. Visit the CTS Web site, www.cts.umn.edu/events, for more comprehensive event information. You may also subscribe to e-mail event announcements using our [subscription form](#).

May 1-2, 2007

18th Annual CTS Transportation Research Conference, RiverCentre, St. Paul. Contact Electra Sylva, 612-624-3708, conferences5@cce.umn.edu.
